



The Metropolitan Transportation Planning Process: Key Issues

A Briefing Notebook for
Metropolitan Planning
Organization Board Members

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TABLE OF CONTENTS

Introduction	1
Part I: Overview of Metropolitan Transportation Planning	2
Part II: Major Policy and Planning Issues	10
Air Quality	11
Asset Management	18
Environmental Justice	20
Financial Planning and Programming	22
Freight Movement	25
Land Use and Transportation	28
Models and Their Use	32
Performance Measures	34
Project Development and the NEPA Process	35
Public Participation	38
Safety	40
System Management and Operations (M&O)	42
Transportation Demand Management (TDM)	44
Acronyms and Glossary	45
Appendix: Federally Aided Transportation Programs	52



INTRODUCTION

Transportation helps shape a metropolitan area's economic health and quality of life. Not only does the transportation system provide for the mobility of people and goods, it also influences patterns of growth and economic activity through accessibility to land. Furthermore, the performance of this system affects such public policy concerns as air quality, environmental resource consumption, social equity, "smart growth," economic development, safety, and security. Recognizing the critical links between transportation and other societal goals, metropolitan areas have been undertaking a formal process of transportation planning for many decades. The planning process is more than merely listing highway and transit capital investments, it requires developing strategies for operating, managing, maintaining, and financing the area's transportation system in such a way as to advance the area's long-term goals.

Because transportation can have a substantial impact on a metropolitan area, the American Association of State Highway and Transportation Officials (AASHTO), the American Public Transportation Association (APTA), and the Association of Metropolitan Planning Organizations (AMPO), requested a document be prepared to serve as a primer for MPO board members. This notebook is the Federal Highway Administration's (FHWA) and the Federal Transit Administration's (FTA) response to that request; it provides state and local officials, planning board members, and transportation service providers with an overview of transportation planning. This notebook provides a basic understanding of the key concepts, along with references for additional information. Part I discusses transportation planning and its relationship to decisionmaking. Part II presents short descriptions of important policy and planning topics. It is not intended to provide details of each policy issue. This report is available electronically at the following website: www.mcb.fhwa.dot.gov and will be updated periodically to include additional topics or information.

Questions about any of the topics discussed in this book should be directed to the MPO staff in your region. For additional support, contact your local FHWA division or FTA regional office. For information on how to reach FHWA or FTA staff, visit the FHWA and FTA websites at: www.fhwa.dot.gov and www.fta.dot.gov, or the Metropolitan Capacity Building web site at www.mcb.fhwa.dot.gov.



PART I: OVERVIEW OF METROPOLITAN TRANSPORTATION PLANNING

Metropolitan transportation planning provides the information, tools, and public input needed for improving transportation system performance. Transportation planning should reflect the community's vision for its future. It should also include a comprehensive consideration of possible strategies; an evaluation process that encompasses diverse viewpoints; the collaborative participation of relevant transportation-related agencies and organizations; and an open, timely, and meaningful involvement of the public. Transportation planning requires a comprehensive, holistic look at the needs and the future of the region and its inhabitants as shown in Figure 1.

Stakeholders:

Individuals, organizations, and agencies with an interest in or who are affected by the transportation planning process.

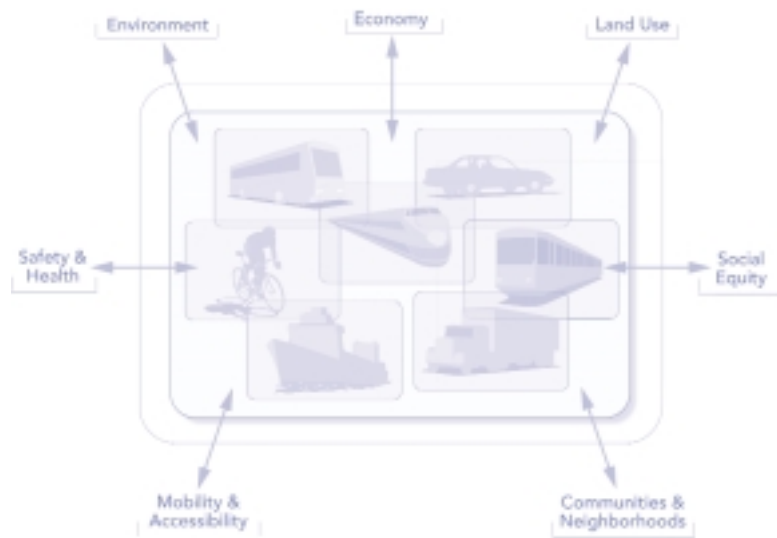


Figure 1: Links between transportation and other societal goals: transportation decisions affect our society in many ways. Conversely, many of society's decisions have an impact on our transportation system.

What is the metropolitan transportation planning process?

Transportation planning in metropolitan areas is a collaborative process, led by the metropolitan planning organization (MPO) and other key stakeholders in the regional transportation system.

The process is designed to foster involvement by all interested parties, such as the business community, community groups, environmental organizations, and the general public, through a proactive public participation process conducted by the MPO in coordination with the state department of transportation and transit operators. It is essential to extend public participation to include people who have been traditionally underserved by the transportation system and services in the region. Neglecting public involvement can result in unnecessary delays, litigation, and can erode public trust. Figure 2 illustrates the metropolitan transportation planning process.

The planning process includes a number of steps:

- Forecasting future population and employment growth;
- Assessing projected land uses in the region;
- Identifying major growth corridors and analyzing, through detailed planning studies, various transportation improvements;
- Developing alternative capital and operating strategies for people and goods;
- Estimating the impact of the transportation system on air quality within the region; and
- Developing a financial plan that covers operating costs, maintenance of the system, system preservation costs, and new capital investments.



Figure 2: The metropolitan transportation planning process

What is a Metropolitan Planning Organization and its functions?

A metropolitan planning organization (MPO) is a transportation policy-making organization made up of representatives from local government and transportation authorities. The Federal Surface Transportation Assistance Act of 1973 required the formation of a MPO for any urbanized area with a population greater than 50,000. MPOs were created in order to ensure that existing and future expenditures for transportation projects and programs were based on a comprehensive, cooperative, and continuing (3-C) planning process. Federal funding for transportation projects and programs are channeled through this planning process.

There are five core functions of an MPO:

Establish a setting: Establish and manage a fair and impartial setting for effective regional decisionmaking in the metropolitan area.

Evaluate alternatives: Evaluate transportation alternatives, scaled to the size and complexity of the region, to the nature of its transportation issues, and to the realistically available options. (These evaluations are included in the Unified Planning Work Program or UPWP-see page 6).

Maintain a Long Range Transportation Plan (LRTP): Develop and update a long-range transportation plan for the metropolitan area covering a planning horizon of at least twenty years that fosters (1) mobility and access for people and goods, (2) efficient system performance and preservation, and (3) quality of life.

Develop a Transportation Improvement Program (TIP): Develop a program based on the long-range transportation plan and designed to serve the area's goals, using spending, regulating, operating, management, and financial tools.

Involve the public: Involve the general public and all the significantly affected sub-groups in the four essential functions listed above.

Air quality nonattainment or maintenance:

An area that has not met the requirements for clean air as set out in the Clean Air Act Amendment of 1990. If such an area is nonattainment but is taking the required steps to comply with the law, it is put on a probationary status called "maintenance."

In addition to meeting federal mandates, MPOs often have extra responsibilities under state law. For example, in California, MPOs are responsible for allocating some non-federal transportation funds in their regions, while other states give MPOs a shared role in growth management and land use planning.

The metropolitan planning process should include active outreach strategies to give people the opportunity to provide input. Opportunities for the public to get involved are to occur throughout the process, especially while the plan and the TIP are being developed. Special attention should be given to involving those groups who are underrepresented or have been underserved in the past in terms of the expenditure of transportation dollars (see section on Environmental Justice).

A metropolitan area's designation as an air quality nonattainment or maintenance area creates additional requirements for transportation planning. Most importantly, transportation plans, programs, and projects must conform with the state's air quality plan, known as the state implementation plan (SIP).

Areas with populations over 200,000 are called transportation management areas (TMAs). TMAs must have a congestion management system (CMS) that identifies actions and strategies to reduce congestion and increase mobility. In nonattainment areas, projects that increase capacity for single occupancy vehicles (by adding new roads or widening existing ones) must conform with the area's CMS.

Capacity:

How well an area can accommodate a stream of traffic in a given place at a given time. Increased capacity can come from building more roads, installing more public transit, or from many other sources.

In accordance with federal regulations, the MPO is required to carry out metropolitan transportation planning in cooperation with the state and with operators of publicly owned transit services. The MPO approves the transportation plan. Both the governor and the MPO approve the TIP. In nonattainment or maintenance areas for air quality, the MPO is responsible for coordinating transportation and air quality planning.

Most MPOs are not the actual implementing agencies for projects, but must provide an overall coordination role in planning and programming funds for projects and operations.

The MPO must involve local transportation providers in the planning process by including transit agencies, airport authorities, maritime operators, rail-freight operators, Amtrak, port operators, and others within the MPO region.

What are the relationships among the MPO, the state DOT, and other agencies involved in transportation planning and project implementation?

Transportation planning must be cooperative, because no single agency has responsibility for the construction, operation, or maintenance of the entire transportation system. For example, some roads that are part of the Interstate Highway System are subject to certain standards and are usually maintained by a state DOT. Others are county arterials or city streets designed, operated, and maintained by counties or local municipalities. Transit systems are often built, operated, and maintained by a separate entity. The MPO is responsible for actively seeking the participation of all relevant agencies and stakeholders in the planning process.

Single occupancy vehicles:

Cars with just one occupant, the driver. The large number of single occupancy vehicles on the road at rush hour in cities is recognized as a major cause of pollution.

What are the key documents produced by the metropolitan planning process?

As illustrated in Figure 3, there are three key documents produced by the metropolitan planning process:

	Time / Horizon	Contents	Update Requirements
UPWP	1-2 Years	Planning Studies & Tasks	Annually
PLAN	20 Years	Future Goals, Strategies & Projects	Every 5 Years (3 years for non-attainment and maintenance areas)
TIP	3 Years	Transportation Investments	Every 2 Years

Figure 3: Key planning products



The Unified Planning Work Program (UPWP): The UPWP lists the transportation studies and tasks to be performed by the MPO staff or a member agency. Because the UPWP reflects local priorities, the content differs from one metropolitan area to another. The UPWP contains several elements:

- The planning tasks and studies that will be conducted over a one- to two-year period;
- All federally funded studies as well as all relevant state and local planning activities conducted without federal funds;
- Funding sources identified for each project;
- A schedule of activities; and
- The agency responsible for each task or study.



The Long Range Transportation Plan (LRTP) or Metropolitan Transportation Plan (MTP): The transportation plan is the statement of the ways the region plans to invest in the transportation system. The plan shall "include both long-range and short-range program strategies/actions that lead to the development of an integrated intermodal transportation system that facilitates the efficient movement of people and goods." (23 CFR450C, Sec.450.322)

The plan has several elements, for example:

- Identify policies, strategies, and projects for the future;
- Determine project demand for transportation services over 20 years;
- Focus at the systems level, including roadways, transit, non-motorized transportation, and intermodal connections;
- Articulate regional land use, development, housing, and employment goals and plans;
- Estimate costs and identify reasonably available financial sources for operation, maintenance, and capital investments (see Part II, section on financial planning);
- Determine ways to preserve existing roads and facilities and make efficient use of the existing system;
- Be consistent with the statewide transportation plan; and
- Be updated every five years or three years in air quality nonattainment and maintenance areas.

MPOs should make special efforts to engage interested parties in the development of the plan. In cases where a metropolitan area is designated as a nonattainment or maintenance area, the plan must conform to the SIP for air quality (see section on air quality).



Transportation Improvement Program (TIP): The TIP is a financially constrained three-year program covering the most immediate implementation priorities for transportation projects and strategies from the metropolitan transportation plan. It is the region's way of allocating its limited transportation resources among the various capital and operating needs of the area, based on a clear set of short-term transportation priorities.

Under federal law, the TIP:

- Covers a minimum three-year period of investment;
- Is updated at least every two years;
- Is realistic in terms of available funding (known as a fiscally constrained TIP) and is not just a “wish list” of projects;
- Conforms with the SIP for air quality if the region is designated a nonattainment or maintenance area;
- Is approved by the MPO and the governor for air quality; and
- Is incorporated into the statewide transportation improvement program (STIP).

How is federal transportation funding provided to metropolitan areas?

The funding for transportation plans and projects comes from a variety of sources including the federal government, state governments, special authorities, assessment districts, local government contributions, impact fees, and tolls. However, in most metropolitan areas, federal funding, transferred first to the state to be distributed to metropolitan areas, is considered to be the primary funding source for plans and projects. (See appendix for a description of the most important federally aided transportation programs.) The financing provisions introduced in 1991 with the enactment of the Intermodal Surface Transportation Equity Act for the 21st Century (ISTEA) and continued in 1998 with the reauthorizing legislation known as the Transportation Equity Act (TEA-21) are obtained through the Federal Highway Trust Fund and supplemented by general funds. It is important to remember that most FHWA sources of funding are sent to and administered by the state DOTs. The state DOT then allocates the money to urban and rural areas, based on local priorities and needs. Most transit funds for urban areas are sent directly from the FTA to the transit operator. (Transit funds for rural areas are administered by the state DOT.)

Federal funds are made available to a metropolitan area through a specific process:

- **Authorizing Legislation:** Congress enacts legislation that establishes or continues the existing operation of a federal program or agency, including the amount of money it will have to spend. Congress re-authorizes federal transportation programs (known as the Federal-aid Highway Program) generally over a multi-year time period. The amount authorized, however, is not always the amount that ends up being available to spend.

- **Appropriations:** Each year, Congress decides on the federal budget for the next fiscal year. This process is known as the appropriation process. The amount appropriated to a federal program is often less than the amount authorized for a given year and is the actual amount available to federal agencies to spend.
- **Apportionment:** The distribution of funds among states using a formula provided in law is called an apportionment. An apportionment is usually made on the first day of the federal fiscal year (October 1) for which the funds are authorized. At that time, the funds are available for obligation (spending) by the state, in accordance with the state's approved transportation improvement program. In many cases, the state is the designated recipient for federal funds for transportation; in some cases, transit operators are the recipient.
- **Determining Eligibility:** Only certain specific projects and activities are eligible to receive federal transportation funding.
- **Matching:** Most federal transportation programs require a non-federal match. State or local governments must contribute some portion of the project cost. This matching level is established by legislation. Normally, the amount the state or local governments have to contribute is 20 percent of the project cost.

How do these funding processes affect MPOs?

These various funding procedures determine the way MPOs receive funding from federal sources. For example, Congress **authorizes** the use of federal funds for transportation planning purposes. These are called metropolitan planning funds, available from FHWA and FTA programs. The total amount of planning funding available equals one percent of the total amount of highway program funding **appropriated** in congressionally defined categories. A formula has been developed to **apportion** these funds to each state on the basis of that state's urbanized population as a ratio of the nation's total urbanized area population. MPOs can use these funds for all **eligible** planning activities. The federal **matching** for these funds is 80 percent, unless the Secretary of Transportation determines that increasing or decreasing this contribution level is warranted.

How is federal funding used?

There are many federal-aid transportation programs that support transportation activities in metropolitan areas, each having different requirements and program characteristics. The Federal-aid Highway Program is not a "cash up front" program but a reimbursable program. That is, even though the authorized amounts are "distributed" to the states, no cash is actually disbursed at this point. Instead, states are notified that they have federal funds available for their use. Projects are approved and work is started; then the federal government reimburses the states for costs as they are incurred, reimbursing up to the limit of the federal share.

The federal government holds funding recipients accountable for complying with all applicable federal laws. When local governments directly oversee a federally funded project, the state DOTs are responsible for the local governments' compliance with federal laws.

What are flexible funds?

One recent change in federal transportation legislation allows the use of certain Federal-aid Highway Program funds for either highway or transit projects. This is referred to as flexible funding or “flex funds.” The “flexible funding” provisions introduced in ISTEA and continued with TEA-21 were a radical departure from traditional transportation policy. Prior to the passage of ISTEA, transit, highway, and safety federal programs had very strict eligibility requirements, and funds could not be transferred between the programs. The ability to transfer funds (with certain restrictions) between highway and transit was introduced in ISTEA so metropolitan areas could apply federal transportation funds to their highest priority transportation projects. Flexible funding is primarily used for FHWA’s Surface Transportation Program (STP) and Congestion Mitigation and Air Quality Improvement Program (CMAQ), and FTA’s Urban Formula Funds.

In urbanized areas with a population of over 200,000, MPOs are responsible for applying flexible funding to meet local planning priorities. In non-urbanized areas with populations under 200,000, flexible funding decisions are made jointly by the MPO and the state DOT, and the state DOT makes the flexible funding decisions in rural areas.

Additional sources of information:

For a description of the federal legislative process as it relates to the transportation program, see www.fhwa.dot.gov/reports/fifahiw/fifahi02.htm.

For an overview of federal funds made available to FTA, U.S. transit agencies, state Departments of Transportation, and metropolitan planning organizations for transit purposes, see www.fta.dot.gov/library/money/budget.

For a complete list of federally-aided transportation programs, see: <http://www.fhwa.dot.gov/infrastructure/progadmin> and <http://www.fta.dot.gov/library/policy>.

For a complete list of FHWA discretionary programs, see www.fhwa.dot.gov/discretionary/proginfo.htm.



PART II: MAJOR POLICY AND PLANNING ISSUES

Although the transportation planning process for a metropolitan area is concerned primarily with the issues facing a particular metropolitan area, there are many issues common to all parts of the country. This section addresses these areas of commonality and provides additional detail on several important issues facing MPOs as they undertake transportation planning for their regions.

The purpose of each topic is to provide a basic understanding of the issue, discuss the role of the MPO, answer other questions about how the topic is addressed in the transportation planning process, and provide references for further information. The following topics are covered in this section:

Air Quality

Asset Management

Environmental Justice

Financial Planning and Programming

Freight Movement

Land Use and Transportation

Models and Their Use

Performance Measures

Project Development and the NEPA Process

Public Participation

Safety

System Management and Operations (M&O)

Transportation Demand Management (TDM)

AIR QUALITY

What is the relationship between transportation and air quality?

Air quality issues play a major role in metropolitan planning. MPOs need to have a clear idea of what is required to achieve air quality attainment status, since nonattainment can halt transportation programs. Air pollution is caused by the interaction of topography, weather, and human influences on the environment, such as manufacturing, use of petroleum-based products like gasoline, and even small business activities, such as dry cleaning.

Sources of air pollution can be classified as stationary, area, or mobile sources, as shown in Figure 4.

Stationary sources include relatively large, fixed facilities such as power plants, chemical process industries, and petroleum refineries.

Area sources are small, stationary, nontransportation sources that collectively contribute to air pollution, and include such sources as dry cleaners and bakeries, surface coating operations, home furnaces, and crop burning.

Mobile sources include on-road vehicles such as cars, trucks, and buses; and off-road sources such as trains, ships, airplanes, boats, lawnmowers, and construction equipment.



* Emissions reductions targets developed by the state environmental agency

Figure 4: All sources of pollution can be looked at for ways to reduce emissions and improve air quality

Clean Air Act:

The Clean Air Act sets out the criteria by which transportation plans, programs, and projects are assessed for compliance with air quality requirements. An area that meets the requirements is in conformity.

The key transportation-related pollutants are ozone precursors, carbon monoxide (CO), and fine particulates (PM-10, or particles smaller than 10 microns, which are more likely to lodge in human lungs than larger particles). The ozone precursors are pollutants that combine to form ground-level ozone, which in turn is part of smog. Ozone precursors are volatile organic compounds (VOCs) and nitrogen oxides (NOx). These pollutants all emanate in part from on-road mobile sources and cannot exceed certain specified levels in a given region.

Nonattainment areas are geographic areas that do not meet the federal air quality standards, and maintenance areas are areas that formerly violated but currently meet the federal air quality standards. If no violations of air quality standards have been found, the area is considered to be in compliance or attainment with federal air quality standards. The Clean Air Act (CAA) of 1990 identifies the actions states and MPOs must take to reduce emissions from on-road mobile sources in nonattainment and maintenance areas.

The CAA and TEA-21 both require that transportation and air quality planning be integrated in areas designated by the U.S. Environmental Protection Agency (EPA) as air quality nonattainment or maintenance areas. In fact, in nonattainment and maintenance areas, federal funding for transportation projects is only available if transportation and air quality planning are integrated through the conformity process.

An area can be nonattainment for one pollutant and in compliance for another. Transportation conformity is required for all ozone, carbon monoxide, and fine particulate nonattainment and maintenance areas.

What is the role of the MPO in air quality issues?

The challenge for MPOs in nonattainment and maintenance areas is to decide on a mix of transit and highway investments that, combined with measures such as Inspection and Maintenance (I/M) programs or reformulated gasoline, will keep emissions within the allowable limits for emissions from motor vehicles.

According to the CAA, transportation plans, TIPS, and projects cannot:

- Create new violations of the National Ambient Air Quality Standards (NAAQS);
- Increase the frequency or severity of existing violations of the standards; or
- Delay attainment of the standards.

Reformulated gasoline:

Gasoline blended to burn more completely and evaporate less easily. Fewer volatile organic compounds (VOCs) are released into the air, thus reducing ozone.

MPOs are encouraged to participate in air quality planning and to identify transportation programs and projects that will help reduce emissions from on-road mobile sources of pollution. The transportation conformity process includes a number of requirements that MPOs must meet (see section below on transportation conformity).

Though not required, many MPOs have developed public education and communications programs to inform the public of the connection between transportation and air quality in their respective regions, and to encourage the public to make travel choices that will benefit air quality.

What is transportation conformity and how does it relate to the NAAQS?

The transportation conformity process, as illustrated in Figure 5, is a way to ensure that transportation projects meet air quality goals in order to be eligible for federal funding and approval. Whenever a long-term transportation plan or TIP is approved or updated, the MPO must make sure that all plans and programs comply with the conformity requirements.

Inspection and Maintenance Programs:

State programs that require vehicles to be inspected and repaired to comply with specific air quality standards, most commonly for carbon monoxide and ozone.

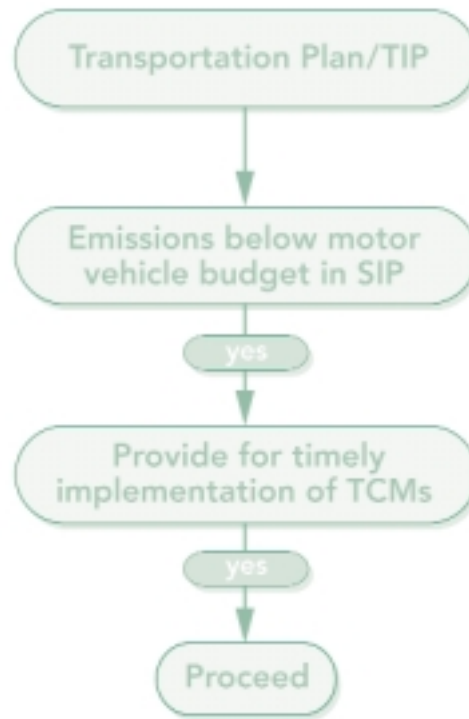


Figure 5: Transportation conformity process

Ambient air:

The outdoor air in a given area, and its level of pollution. It is monitored according to two sets of criteria: A **primary standard** to protect public health, including the health of populations such as children, the elderly, and asthmatics; and a **secondary standard** to protect public welfare, including effects on soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility, transportation, and other economic values, as well as personal comfort and well-being.

Transportation Control Measures:

Specific measures that reduce emissions by either reducing vehicle use or reducing traffic flow. Examples: improved public transit, high-occupancy vehicle lanes, shared-ride services, bicycle/pedestrian facilities, and flexible work schedules.

The CAA requires that each state environmental agency develop a plan called a State Implementation Plan (SIP). The SIP shows *how* the state will meet the National Ambient Air Quality Standards (NAAQS) for each type of air pollutant, according to the schedules included in the CAA. Pollutants are usually measured in parts per million (ppm) of ambient air, and standards vary by type of pollutant. Each region undergoes a regional emissions analysis and is assigned an emissions budget for each type. Projects added later to the SIP must still be within the emissions budget.

For each source category (stationary, area, or mobile), the SIP assigns emission reduction targets. For on-road mobile sources, the emission reduction target is further refined into a motor vehicle emissions budget. As a nonattainment area gets closer to its attainment date (e.g., 2005, 2007, 2010), the motor vehicle emissions budget may decrease.

Vehicle emissions programs (e.g., the use of reformulated gasoline or implementation of Inspection and Maintenance [I/M] programs); changing *how* we travel (e.g., ride sharing or use of transit); or transportation projects that reduce congestion (e.g., signal synchronization programs) can all help areas meet emission reduction targets for on-road mobile sources. MPOs should be actively involved with the state in setting the motor vehicle emissions budgets. Transportation officials need to educate themselves about the options and trade-offs available to them, so they can balance the need for transportation investment with the need to achieve healthful air.

Motor vehicle emissions budgets can be revised. However, doing so requires revising the SIP, which is a complicated and lengthy process that can make it harder for the MPO to get projects started. MPOs should participate in the SIP revision process if it is undertaken.

What is a conformity determination and who makes it?

In order to maintain conformity with current air quality standards, the transportation projects in the Long Range Plan and the Transportation Improvement Program must not exceed the region's budget of motor vehicle pollution set forth in the SIP. A conformity determination is a finding by the MPO policy board, and subsequently by FHWA and FTA, that the transportation plan and TIP meet the conformity requirements. While the MPO is ultimately responsible for making sure a conformity determination is made, the conformity process depends on federal, state, and local transportation and air quality agencies working together to meet the transportation conformity requirements.

If transportation control measures (TCMs) are part of the SIP, the MPO must provide an assurance that TCMs are being implemented on schedule each time it updates its plan and TIP.

Regionally significant projects:

In the planning community, regionally significant projects serve regional transportation needs such as access to and from the major activity centers in the region, and would normally be included in the modeling of a metropolitan area's transportation network. These projects include, at a minimum, all principal arterial highways and all fixed-guideway transit facilities.

A necessary part of the transportation and air quality planning process is consulting with other involved agencies on critical issues and providing opportunities for public participation. MPOs must inform the public that they are going to make a conformity determination, make all relevant documents reasonably available, and give adequate time to review the documents and supporting materials.

What plans, programs, and projects are subject to transportation conformity requirements?

The MPO's 20-year transportation plan and TIP must meet the conformity requirements. This includes all projects that are expected to be funded or that will require an approval by FHWA/FTA at any point during the life of the plan or TIP.

Also, any regionally significant projects (as defined by the conformity rule), even those that are not federally funded or approved, must be included in the regional emissions analysis of the transportation plan and TIP. Regionally significant projects may include arterials in and out of the region, road projects affecting airports, transit, and freight terminals.

Finally, certain projects must be assessed for expected concentration levels ("hot spots") of carbon monoxide and fine particulates.

How frequently must a transportation conformity determination be made and what happens if the MPO cannot make a conformity determination on time?

A conformity determination must be made on the transportation plan and TIP at least once every three years. Each time the MPO updates its transportation plan or its TIP (except for minor amendments), a conformity determination is required. A conformity determination is also required not more than 18 months after a SIP or a SIP revision is submitted to EPA.

If an MPO cannot meet the transportation conformity requirements (i.e., is in a conformity lapse), then only certain types of projects may proceed until the requirements are met.

The MPO has two choices if it cannot make a conformity determination: 1) it can change the mix of projects in the transportation plan/TIP in an attempt to meet the conformity requirements or 2) it can request a SIP revision of the motor vehicle emissions budget.

Under the metropolitan planning requirements of TEA-21, projects cannot be approved, funded, or implemented unless those projects are included in a conforming transportation plan and TIP that is fiscally constrained. This means that the funding necessary to implement the transportation plan is reasonably expected to be available over the 20-year plan period, and that funding for the first two years of the TIP is identified and committed.

What funding is available for air quality improvement programs and projects?

The Congestion Mitigation and Air Quality Improvement Program (CMAQ) was started in 1991 as an innovative and flexible funding source for transportation projects and programs that helps states and MPOs meet the requirements of the Clean Air Act. The CMAQ program was continued in TEA-21, and Congress authorized total funding of \$8.1 billion over six federal fiscal years, from 1998 to 2003.

Under the CMAQ program, states receive funding based on the severity of pollution and the population by county of each nonattainment and maintenance area. Preference is given to areas that violate both the ozone standard and the carbon monoxide standard. Each state receives CMAQ funding and then allocates funds, at the state's discretion, to the air quality nonattainment and maintenance areas.

How much money does the MPO receive each year in CMAQ funding?

Each year, the amount of funding any individual MPO receives varies depending on the following factors: severity of pollution, population, and whether both the ozone standard and the CO standard are violated. The FHWA posts the annual population numbers in each nonattainment and maintenance area, and the weighting formula for the apportionments of CMAQ funding, on its website at: www.fhwa.dot.gov/environment/cmaq.htm.

What types of projects are funded with CMAQ funding?

CMAQ funding is reserved for projects that reduce congestion and/or improve air quality. Typical projects include transit improvements, shared-ride services, traffic flow improvements, pedestrian and bicycle programs, construction of high-occupancy vehicle (HOV) lanes, I/M programs, and transportation demand management strategies. Guidance on the CMAQ program can be found at www.fhwa.dot.gov/environment/cmaq.htm.

Who decides which projects receive CMAQ funding?

Decisions must be coordinated through the MPO planning process, and are made collaboratively by the MPO and state, subject to federal eligibility guidelines. These guidelines are quite flexible, in order to promote innovation.

What other sources of federal funding are there for air quality improvement projects?

The Surface Transportation Program (STP) in TEA-21 allows states to use certain funds (known as "flex" funds) for a variety of projects, including transit, transportation demand management, and other strategies that will help to reduce emissions.

The FTA provides funding for public transit projects, including fixed rail transit, rail modernization, buses and bus facilities (including the purchase of alternatively fueled buses), and other public transit projects. Other sources of funding include programs administered by the EPA and the U.S. Department of Energy; in many areas, state and local funding programs are in place.

Additional sources of information:

<http://www.fhwa.dot.gov/environment/conform.htm> gives a basic explanation of conformity and provides policy guidance.

<http://www.fhwa.dot.gov/environment/cmaq.htm> provides a brochure about CMAQ, outlines policy, and gives helpful links.

<http://www.fta.dot.gov/office/planning/envr.htm> provides information on CMAQ, Transportation and Air Quality Impacts of Transit Projects and a description of the FTA General Noise Assessment Spreadsheet.

www.fhwa.dot.gov/environment/fundprog.htm is a helpful source of information on funding programs.

<http://www.energy.gov/transportation/index.html> is a consumer-oriented site hosted by the Department of Energy on how to save fuel, and provides a helpful example of how MPOs can educate the public about air quality.

U.S. Environmental Protection Agency, *Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Funded or Approved Under Title 23 U.S.C. of the Federal Transit Act, Title 40 CFR, Parts 51 and 93, November 24, 1993, as amended in August 1995, November 1995, and August 1997.*

ASSET MANAGEMENT

What is Transportation Asset Management?

Transportation Asset Management is a strategic framework for making cost-effective decisions about allocating resources (funding and personnel) and managing infrastructure (physical assets such as roads, equipment, and buildings). It is based on a process of monitoring the physical condition of assets, predicting deterioration over time, and providing information on how to invest in order to maintain or enhance the performance of assets over their useful life.

What is the role of the MPO in asset management?

A metropolitan area's transportation system represents a massive investment in transportation facilities and the capital assets used to operate and maintain this system. With the total government investment just in roads and bridges in the United States estimated to be over \$1 trillion, the transportation system is most likely the largest government-owned asset in any metropolitan area.

Use, as well as wear and tear from the environment (such as heaving from freezing and thawing), will make transportation infrastructure deteriorate over time. Therefore, one of the main goals of transportation agencies is preservation, to keep the infrastructure in operating condition. If roads, bridges, airports, transit facilities, ports, bicycle and pedestrian paths, etc. are not maintained, people and goods will not move as easily, resulting in reduced quality of life and diminished economic activity.

The MPO can support asset management by encouraging the collection of data and use of the resulting information for establishing priorities for improving the area's transportation assets. Typically, the MPO does not, on its own, develop and/or operate an asset management decisionmaking framework. This is usually the responsibility of state and local operating agencies.

What are the steps decisionmakers use in the transportation asset management process?

The following steps are typical for the asset management process:

1. Decisionmakers establish expectations for the transportation system's performance, and use them to guide the analytical process, as well as the decisionmaking framework. These expectations must be consistent with goals, available budgets, and organizational policies.
2. The transportation system is inventoried, and performance data is collected and analyzed. This information is used to determine what is needed.

Facilities:

As used in the transportation world, "facilities" means all the fixed physical assets of a transportation system, such as roads, bus terminals, bridges, bike paths, and train stations.

Capital assets:

A capital asset is an item, usually non-real estate, that has a useful life of greater than one year and a unit cost of \$5,000 or more. Examples: road repair equipment, computer systems, buses.

3. Analytical tools and models are used to find cost-effective strategies for allocating the budget to meet performance expectations. The alternative choices are evaluated according to how well they meet long-range plans, policies, and goals.
4. Decisions are made and implemented. Decisionmakers need to take into account actual project development, construction, and operation.
5. The entire process is reevaluated annually.

What questions should MPOs ask as part of Asset Management?

- What is our inventory of assets?
- What is the value of our assets (monetary, importance to region, other)? What are their functions? What services do they provide?
- What are the past, current, and predicted future condition and performance of our assets?
- How can we preserve, maintain, or improve our assets to ensure maximum useful life and provide acceptable service to the public?
- What resources are available? What is the budget? How much funding can we expect in the future?
- What are our choices for investing our transportation budget? What are the costs and benefits of such choices?
- Which choice, or combination of choices, is optimal?
- What are the consequences of not maintaining our assets? How can we communicate those consequences?

Additional sources of information:

Asset Management: Advancing the State of the Art Into the 21st Century Through Public Private Dialogue, FHWA, Report No. FHWA-RD-97-046. Information on obtaining a copy of this report may be found at: www.fhwa.dot.gov/pubstats.html.

Asset Management Primer, FHWA, December 1999. <http://www.fhwa.dot.gov/infrastructure/asstmgmt/amprimer.pdf>.

<http://www.fhwa.dot.gov/infrastructure/asstmgmt/index.htm>.

ENVIRONMENTAL JUSTICE

What is environmental justice?

The goal of environmental justice is to ensure that services and benefits are fairly distributed to all people, regardless of race, national origin, or income, and that they have access to meaningful participation. Environmental justice in transportation programs is achieved through:

- Avoiding, minimizing, or mitigating disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations.
- Ensuring the full and fair participation in the transportation decisionmaking process by all potentially affected communities.
- Preventing the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

What is the role of the MPO in incorporating environmental justice into transportation planning?

As the agency responsible for coordinating the regional transportation planning process, the MPO must make sure that all segments of the population have been involved with the planning process.

The impact of proposed transportation investments on underserved and under-represented population groups must be part of the evaluation process. In particular, the following questions are important in addressing environmental justice issues in the planning process:

1. How will the public participation process reach low-income and minority communities? Specifically:
 - How and where will information be disseminated?
 - What information will be disseminated?
 - Where and when will public meetings be held?
 - At what point in the planning process do the meetings take place?
 - Are other avenues being used to reach minority/low-income communities (e.g., contacts with community leadership, community advisory boards, focus groups, surveys, etc.)?
 - How will the process elicit issues of particular concern to low-income and minority communities?

2. What statistics are being collected about minority/low-income communities, and how are they used to assess possible inequities? Actions to take include:
 - Evaluating what information is already being collected.
 - Identifying what further information can and should be collected.
 - Analyzing the data to identify potential inequities.
 - Developing measures to verify whether there is equitable distribution of the benefits and burdens of transportation services.
3. How are information and data incorporated into decisionmaking? Questions to ask include:
 - How is environmental justice considered in creating the transportation plan?
 - How is environmental justice information collected by the MPO and relayed to officials?
 - Is additional information needed to adequately consider the impacts of transportation decisions on low-income and minority communities?
 - How are the specific interests of minority and low-income populations addressed in transportation policies, plans, and projects?

What are the regulatory foundations for environmental justice?

The legal foundation for environmental justice considerations is Title VI of the Civil Rights Act of 1964, which prohibits discrimination in any program receiving federal assistance.

The 1969 National Environmental Policy Act (NEPA) and 23 USC 109(h) also require that social, economic, and environmental consequences of programs be considered when contemplating any action having federal support.

The FHWA and the FTA have jointly issued policy guidance on how environmental justice concerns can be incorporated into metropolitan transportation planning.

Additional sources of information:

<http://www.fhwa.dot.gov/environment/ej2.htm> provides extensive information and case studies on environmental justice.

<http://www.fta.dot.gov/office/planning/enviranj.html> is another resource on FTA's website.

FINANCIAL PLANNING AND PROGRAMMING

What is financial planning?

Financial planning takes a long-range look at how transportation investments are funded, and at the possible sources of funds. MPOs must consider funding needs over the 20-year period of the long-range transportation plan, and develop a financial plan that identifies funding sources for needed investments, including the maintenance and operation of the existing transportation system.

What is financial programming?

Programming funds means identifying funds for specific projects in the TIP, which generally covers a three-year period. Notifying FHWA and FTA of the sources of the funds that will likely be used to support each project is part of programming.

What is the financial plan element of the long-range transportation plan?

The long-range transportation plan must include a financial section that estimates how much funding will be needed over the life of the plan, and how the MPO can reasonably expect to fund the projects included in the plan, including anticipated revenues from FHWA and FTA, state government, regional or local sources, the private sector, and user charges.

For example, a financial plan could assume that the amount of available federal funding will remain constant over the first five years of the plan, and then escalate at a rate equal to inflation or the Consumer Price Index (CPI). It could also assume that state gasoline taxes dedicated to transportation will be increased every five years by a certain amount based on past trends. Further, the transportation plan might assume a new revenue source from a local sales tax within an MPO region, so long as there is reason to believe such a new source will be available.

How are funds programmed?

Each state must submit a State Transportation Improvement Program (STIP - this is the programming document for the state) to FHWA/FTA every two years. The STIP includes all of the projects planned for implementation with the funds expected from FHWA and FTA for the upcoming three years, and includes each MPO's TIP and all of the projects included in the first three years of that TIP.

The STIP must be fiscally constrained, which means that the costs of the projects in the STIP must not exceed projected reasonably available revenue while ensuring continued funding for the operation and maintenance of the existing transportation system.

Amendments to the STIP are common, given the frequency of changes in engineering modifications, environmental issues, contracting issues, project readiness, and other factors that require project schedules and budgets to be adjusted from time to time. If an MPO wants to amend a project in the STIP, it first must amend its TIP.

What is the process by which a TIP gets programmed for funding?

- The TIP must be consistent with the transportation plan.
- In the TIP, the MPO indicates which projects will be worked on in each year.
- The MPO must identify which combination of funding sources (federal, state, local) will be used for each project and must show that enough funds will be available for all of the projects.
- Projects included in the first two years of the TIP must have funds (i.e., bonds) available or committed. Some projects are multi-year in nature, which will be indicated in the TIP.

The TIP (after being approved by the MPO and the governor) is then submitted to the state DOT for inclusion in the STIP, which is then submitted to FHWA/FTA. In air quality nonattainment and maintenance areas, the TIP must also meet transportation conformity requirements.

How do MPOs know how much money is going to be available?

TEA-21 requires that revenue forecasts be developed cooperatively by the MPO, the state DOT, and the public transit agency in order to help MPOs know how much funding is likely to be available for transportation projects in their area. This provision is intended to improve financial planning and enable a longer-term view of financial needs.

What are the sources of transportation funds?

Transportation funds come from a number of sources, including income tax, sales tax, tolls, bonds, and state, local, and federal excise taxes on various fuels. The source of transportation funds to construct a particular project can vary greatly from one area to another, because each area can decide which mix of funds is best suited to local needs.

When federal funds are authorized by Congress for the U.S. Department of Transportation, they are allocated into various programs before DOT redirects them to the states. Some primary examples of these programs include the Interstate System/Interstate Maintenance Program, the Highway Bridge Replacement and Rehabilitation program, the Surface Transportation Program (STP) (which includes enhancements funding and safety funding), the Federal Lands Highway Program, and the Congestion Mitigation and Air Quality Improvement Program.

Each of these programs has specific eligibility requirements, although there is quite a bit of flexibility in TEA-21 that allows the shifting of funds among some of the programs. For example, STP funding can be used for transit buses, and interstate program funds can be shifted to other programs so long as interstate highway program investment needs are being fully addressed.

FTA oversees the allocation of federal transit funds, which generally fall into two major categories: formula capital grants for transit operators, and capital investment grants, which include new rail starts funds, rail modernization funds, and funds for buses and bus-related facilities.

TEA-21 also provides formula planning funds that are allocated from various FHWA and FTA programs to states and MPOs. Called State Planning and Research Funds (SPR) and Planning Funds (PL) respectively, these planning funds generally make up a large portion of the MPO budget for conducting necessary studies and for developing transportation plans and TIPS.

Additional sources of information:

<http://www.fhwa.dot.gov/programs.html> is a guide to FHWA programs, core business units, and service business units, providing a handy overview of the agency's activities.

<http://www.fta.dot.gov/library/policy/prgms/toc.htm> serves as a gateway to all of FTA's funding programs and activities as well as providing useful links and updates.

FREIGHT MOVEMENT

What is the role of freight movement in transportation?

The movement of freight is an important part of a metropolitan area's transportation system. The efficient movement of freight within and through a region is critically important to industry, retail, agriculture, international trade, and terminal operators. Metropolitan areas (especially ports) with their air cargo airports, intermodal freight yards, large trucking terminals, and shipyards are especially affected by freight movement issues.

Examples of intermodal freight projects include bridge replacements, road widening, port and rail access roads, terminal facility improvements, grade separations for highway and rail, and providing connections to air cargo and new infrastructure.

What is the role of the MPO in freight transportation planning?

As the forum for cooperative transportation planning and decisionmaking, the MPO is responsible for making sure that freight movement is considered in the transportation planning process.

Many MPOs have systematically incorporated freight movement issues into their planning activities, for example by:

- Defining those elements of a metropolitan area's transportation system that are critical for efficient movement of freight.
- Identifying ways to measure system performance in terms of freight movement.
- Developing freight-oriented data collection and modeling to identify problems and potential solutions.
- Creating a freight movement advisory committee to identify important bottlenecks in the freight network.

Different freight-transport tactics that might be considered in transportation planning include the following:

Truck Restrictions:

Peak period bans
Freeway section bans
Route diversions
Designated access routing
Hazardous materials route restrictions
Local truck and noise ordinances
Peak HOV only/off peak truck lanes

Road Design and Construction:

Capacity and safety improvements
Improved entry/exit ramps and merges
Continuous merge lanes
Exclusive truck facilities

Road Pricing:

Peak period permits
Freeway permits
Peak period tolls
Peak/off-peak rate differentials

Fleet Management:

Voluntary off-peak operations
Automatic vehicle location/routing
Driver training and management

Traffic Engineering:

Lane design restrictions
Wider lanes
Continuous merge lanes
Variable message signs
Sign placement
Truck advisory signs
Speed restrictions

Shipper/Receiver Actions:

Voluntary off-peak operations
Mandatory off-peak operations

Incident Management:

Automated detection
Site and area surveillance/communications
Organizational changes

Inspection/Enforcement:

Automated surveillance
Urban truck inspections/enforcement

Information Management:

Highway advisory radio
Traffic information

What requirements must the MPO adhere to?

TEA-21 states that the transportation planning process should “...support the economic vitality of the metropolitan area (or state), especially by enabling global competitiveness, productivity, and efficiency; increase the accessibility and mobility options available to people and for freight; and enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.”

What funding is available for freight planning and project implementation?

MPOs can use planning funds for freight planning, and can dedicate funds for specific project implementation. Funding of specific freight projects must meet federal eligibility requirements for funding.

Projects that provide improved access to terminals or ports can be included in the federally funded transportation improvement program.

In those cases where freight investment projects can directly bring about reductions in pollutant emissions, Congestion Mitigation and Air Quality funds can also be used to support those projects.

Additional sources of information:

<http://www.fhwa.dot.gov/freightplanning/index.htm> is FHWA's guide to freight planning, providing guidelines, case studies, and a manual.

http://www.ops.fhwa.dot.gov/freight/freight_finance_report.htm is a guide to financing freight transportation improvement.

LAND USE AND TRANSPORTATION

What is the relationship between land use and transportation?

Transportation's basic purpose is moving people and goods from one place to another, but its effect on economic development goes well beyond this. An efficient transportation system can improve the economy, shape development patterns, and influence quality of life and the natural environment.

Land use and transportation are symbiotic: how development is spaced can greatly influence regional travel patterns, and, in turn, the degree of access provided by the transportation system can influence land use distribution.

What is the role of the MPO in land use and transportation?

The role of the MPO varies according to state and locality. In some areas, MPOs are responsible for reviewing local land use decisions considered regionally significant. In others, land use decisions are solely the prerogative of local officials. Regardless of the MPO's role in decisionmaking, transportation planners must make every effort to consider the comprehensive land use plans of the region and local jurisdictions, and create a constructive dialogue with land use officials. In that way, each group is informed of actions that might affect the other.

What are the requirements for considering land use in the transportation planning process?

Federal planning regulations place considerable importance on the link between transportation planning and land use, though there are no federal laws mandating specific actions. According to the 1993 joint FHWA/FTA regulations for metropolitan and statewide planning, the metropolitan transportation planning process should consider "the likely effect of transportation policy decisions on land use and development and the consistency of transportation plans and programs with the provisions of all applicable short- and long-term land use and development plans...."

The regulations also state that the plan itself should "reflect, to the extent that they exist, consideration of: the area's comprehensive long-range land use plan and metropolitan development objectives; national, state, and local housing goals and strategies; community development and employment plans and strategies...."

How does land use relate to economic development?

Activities meant to stimulate economic development can affect the transportation network and adjacent parcels of land in terms of zoning. It is important to consider the effects of development on the quality of life for residents (i.e., traffic noise, improved mobility, more jobs, etc.), the transportation network, and the regional economy as a whole. Much of this will require balancing projected benefits against projected externalities.

Better planning tools are increasingly available to help MPOs understand the impact of economic development decisions on the transportation network and the natural environment. Examples of planning tools include the following: transportation models that include land use; technology such as Geographic Information Systems (GIS) to help illustrate how transportation facilities can affect specific parts of a region or community; and travel demand and emission models which help show how transportation can affect air quality.

Policymakers should ask what effects proposed investments would have on economic development and on future transportation needs:

- How should an MPO use its available funding to balance and maximize economic growth with transportation priorities?
- Can the transportation system accommodate the increased growth that proposed development might bring?
- What is the trade-off between additional growth in an urban area and the cost of expanding?
- What modes of transportation are most cost-effective in meeting a region's transportation needs?

What is “smart growth?”

Smart growth is a set of policies and programs designed to protect, preserve, and economically develop established communities and valuable natural and cultural resources. Smart growth policies link transportation projects with desired land use patterns in order to make more efficient use of infrastructure (assets such as roads, bridges, and equipment) and reduce environmental impact.

Using a smart-growth approach, an area can consider land use strategies that will reduce both transportation and environmental problems, and achieve quality-of-life goals. These land use strategies may include:

- Site design planning, with an emphasis on pedestrian access and transit service.
- Incentives and bonuses for desired land uses and for developments that provide desired transportation and land use amenities.
- A balance of job growth with housing developments priced and located to match the needs and incomes of the work force.

- Minimum as well as maximum development densities and floor area ratios that ensure adequate ridership for transit.
- Requirements for providing adequate public facilities (i.e., schools, fire and police protection) commensurate with development, or for attaining a minimum level of service standards.
- Urban growth limited to areas where urban services are already available or are scheduled.
- Consistency between local land use plans and local and regional transportation plans.

What is the role of the MPO in smart growth?

Smart growth policies are usually developed and mandated at the state (and sometimes the regional) level. The role of the MPO varies according to the authority and influence it has in regional land use matters.

As the organization that adopts the transportation plan and the TIP, the MPO is able to influence transportation investments toward improving quality of life, and can tailor some transportation activities to improve both specific economic development projects and regional mobility in general. The transportation planning process provides critical input into a regional smart growth strategy. The transportation plan, in particular, outlines the vision and goals for transportation investment, thus incorporating smart growth policies.

Additional sources of information:

A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility. Institute of Transportation Engineers: Washington, D.C., 1997.

Institute of Transportation Engineers "Smart Growth? Sensible Growth? Sustainable Growth? Balanced Growth? Responsible Growth-What Are the Transportation Needs to Achieve This Growth?" *ITE Journal*, April 2000.

Apogee Research, Inc. and Greenhorne & O'Mara, *Research on the Relationship Between Economic Development and Transportation Investment*, National Cooperative Highway Research Program Report 418, Washington D.C.: Transportation Research Board, 1998.

Louis Berger, Inc., *Economic Trends and Multimodal Transportation Requirements*, National Cooperative Highway Research Program Report 421, Washington D.C.: Transportation Research Board, 1999.

M. Bell and T. McGuire, *Macroeconomic Analysis of the Linkages Between Transportation Investments and Economic Performance*, National Cooperative Highway Research Program Report 389, Washington D.C.: Transportation Research Board, 1997.

www.op.state.md.us/smartgrowth

The new Maryland Office of Smart Growth is a “one-stop shop” on smart growth that promotes interagency cooperation to help local governments bring smart growth projects to fruition; serves as an information clearinghouse on smart growth for local officials, developers, and citizen groups; and provides targeted advisory and technical assistance to local jurisdictions, developers, and the public, in cooperation with the Department of Planning.

www.uli.org/indexJS.htm

The Urban Land Institute's mission is to take a leadership role in bringing together people involved in important issues related to land use and the built environment.

MODELS AND THEIR USE

What are models?

Models are simulations of the “real world” that can be used to show the impact of changes in a metropolitan area on the transportation system (such as adding a new road or transit line, or increases in population or employment). Current FHWA and FTA planning regulations require only that the MPO have an analytical process in place for evaluating projects. Models are not required by the federal planning regulations.

Three important assumptions are part of any model used for transportation analysis:

- Key characteristics of the system to be modeled can be described in terms of quantifiable variables (e.g., number of automobiles per household, household size, etc.).
- There is a relationship between these variables and the behavior of individuals or of systems (e.g., the more automobiles per household, the greater the number of automobile trips per household). This relationship is most often expressed in mathematical terms.
- This relationship is the same for all individuals and is constant over time.

Challenges to the validity of transportation models often focus on one of these three assumptions.

What is the four-step modeling process?

For the past 40 years, transportation professionals have used a four-step approach in modeling transportation demand. Most modeling approaches use some form of these steps today. Once some understanding has been established as to what the land use, population, and employment levels are in a study area, the four modeling steps are:

- **Trip generation:** Estimating the number of trips generated in a zone or at a particular location, and attracted to a zone or a particular location, based on the assumed relationship among socio-economic factors, land use characteristics, and the number of trips. Trip generation then leads to:
- **Trip distribution:** Estimating the number of trips that originate in every zone in the study area, with destinations to every other zone. The result is a trip table that is used in:
- **Mode split:** Estimating, for the number of trips predicted between each origin and destination, the number of trips made via each type of mode that is available for that trip. Thus, “x” percent are likely to drive alone, “y” percent are likely to take transit, “z” percent are likely to ride-share, etc. Mode split leads to:

- **Network assignment:** Estimating the number of trips via a particular mode that will take specific paths through a road or transit network. The end result, when all trips are assigned to a network, is an estimate of the total number of trips that will use each link in the network. When compared to the capacity of this link, planners can forecast the level of congestion that will occur at that location. This becomes the basis for assessing the performance of the transportation system.

What are other types of models?

Four-step models are commonly used to predict the demand for transportation services. Transportation planners and engineers also use other types of models to analyze and evaluate the performance of transportation systems and resulting impacts.

Impact models determine the likely effects that constructing and operating transportation facilities will have on the surrounding environment and community. For example, planners often use air quality models, noise models, and community impact models in analyzing transportation alternatives.

Cost models estimate the likely costs of transportation facilities and services. For example, cost models estimate the unit cost per component of a facility (e.g., dollars per linear foot of rail line), and multiply this by the estimated number of units needed. Most recent cost-modeling approaches incorporate a life-cycle costing perspective that requires the planner to estimate expected costs, both capital and operating, for a possible project over the expected life of that project. The total “cost picture” is then presented to decisionmakers when choosing among different alternatives.

What should MPOs consider when presented with the results of models?

Results of a model are still only estimates - they cannot provide a definitive picture of what will happen in the future. Much like economic projections, transportation forecasts are greatly affected by the long-term economic health and attractiveness of the region, by population changes, and by the individual behavior of each person using the transportation system, which no one can predict.

Model results are only as good as the data that go into the model. MPOs must use the most current socio-economic and census data available, especially if the region is growing rapidly. MPOs should make every effort to explain the information and assumptions that went into creating the model in plain, understandable terms.

Additional sources of information:

Cambridge Systematics and Transmode Consultants, *Multimodal Corridor and Capacity Analysis Manual: National Cooperative Highway Research Program Report 399*. Transportation Research Board, 1998.

Meyer, M. and E. Miller, *Urban Transportation Planning: A Decision-Oriented Approach*. New York: McGraw Hill, 2001.

PERFORMANCE MEASURES

What are performance measures?

Performance measures demonstrate how well the transportation system is doing its job of meeting public goals and/or expectations of the transportation network. Some methods used to measure performance include tracking average speeds and accident rates. Many metropolitan areas monitor how close they are to achieving specific goals, such as the mobility of disadvantaged populations, levels of air quality, and the health of the economy, by using performance measures. Performance measures provide feedback on the decisionmaking process. They aim to answer questions such as whether the performance of the transportation system (or economy, air quality, etc.) is getting better or worse over time; and whether transportation investments are making a difference. Examples of performance measures include:

- **Accessibility:** Percent population within “x” minutes of “y” percent of employment sites; whether special populations such as the elderly are able to use transportation; whether transportation services provide access for underserved populations to employment sites; also whether services are ADA compliant.
- **Mobility:** Average travel time from origin to destination; change in average travel time for specific origin-destination points; average trip length; percentage of trips per mode (known as mode split); time lost to congestion; transfer time between modes; percent on-time transit performance.
- **Economic development:** Jobs created and new housing starts in an area as a result of new transportation facilities; new businesses opening along major routes. Percent of region’s unemployed who cite lack of transportation as principal barrier; economic cost of lost time.
- **Environmental quality of life:** Environmental and resource consumption; tons of pollution generated; fuel consumption per vehicle mile traveled.
- **Sprawl:** Change in difference between urban and suburban household densities; decrease in wetlands; changes in air quality, land use, or mobility.
- **Safety:** Number of crash incidents or economic costs of crashes.

What is the role of the MPO in defining and using performance measures?

The MPO can take the lead in creating performance measures that provide information critical to regional and local decisionmakers. Because performance measures strongly influence the goals and objectives of the planning process, their development and ongoing support can become part of the activities of the MPO. If performance measures are to be developed, they should be subject to the MPO-sponsored public involvement program.

Additional sources of information:

A Guidebook for Performance-Based Transportation Planning, NCHRP Report 446. Transportation Research Board: Washington, D.C., 2000.

PROJECT DEVELOPMENT AND THE NEPA PROCESS

What is NEPA and how does it apply to the highway project development process?

The National Environmental Policy Act of 1969 (NEPA) established a national policy to promote the protection of the environment in the actions and programs of federal agencies. The FHWA and FTA has the role of the lead federal agency and is responsible for implementing the NEPA process and working with state and local project sponsors during project development. The FHWA and FTA NEPA process is designed for transportation officials to make project decisions that balance engineering and transportation needs with the consideration of social, economic and environmental factors. This process allows for involvement and input from the public, interest groups, resource agencies and local governments. The FHWA and FTA NEPA process is used as an “umbrella” for compliance with over 40 environmental laws, regulations, and executive orders and provides an integrated or streamlined approach to addressing impacts to the human and natural environment from transportation projects.

How is NEPA related to the Transportation Planning Process?

The NEPA process is designed to promote environmentally sound transportation decisions and cannot be used as a justification for decisions already made. Therefore, a coordinated approach between planning and project development contributes to the selection of transportation investments that reflect community needs, have benefited from an active public involvement process and are sensitive to the environment. The first stages of the NEPA process - development of project purpose and need - should build upon the transportation needs identified during planning and will be the basis for the final selection of an alternative for design and construction. Another direct link between NEPA and transportation planning is the requirement that a project must be included in a conforming plan and TIP before it can be given NEPA approval; a major change in the project scope and design as it evolves during the NEPA process triggers a conformity and plan reassessment.

What NEPA documentation is required?

A good decision based on an understanding of environmental impacts is the objective of the NEPA process and a thorough analysis of these impacts as presented in the NEPA document is essential in meeting that objective. NEPA documentation serves several purposes: to disclose the analysis of benefits and impacts to the human and natural environment; to get input from the public and other stakeholders on the proposed project and the environmental consequences; and to present the final decision and supporting rationale.

Different types of transportation projects will have varying degrees of complexity and potential to affect the environment. Under NEPA, the required environmental document depends on the degree of impact and FHWA and FTA, in coordination with the project sponsor, prepare one or more of the following documents for a proposed project:

- Environmental Impact Statements (EIS) - prepared for projects that have a significant impact on the human and natural environment. Draft EIS (DEIS) and Final EIS (FEIS) documents provide a full description of the proposed project, the existing environment, and the analysis of the beneficial and adverse impacts of all reasonable alternatives, including input from the public.
- Record of Decision (ROD) - presents the selected transportation decision analyzed in an EIS, the basis for that decision, and the environmental commitments to mitigate for project impacts to the human and natural environment.
- Categorical Exclusions (CE) - prepared for projects that do not have a significant impact on the human and natural environment.
- Environmental Assessments (EA) and Finding of No Significant Impacts (FONSI) - prepared for projects where it is not clearly known if there will be significant environmental impacts. If the analysis in the EA indicates the proposed project will have significant environmental impacts, an EIS is prepared. If there is not a significant impact, this conclusion is documented in a separate decision document, the FONSI.

Regardless of the type of NEPA document prepared, final selection or approval of a proposed project alternative by FHWA and FTA allows the project to be eligible for federal funding of subsequent project activities such as final design, right-of-way acquisition, and construction.



Figure 6: Documentation required as part of the NEPA process

Additional sources of information:

<http://nepa.fhwa.dot.gov/ReNepa/ReNepa.nsf/home>.

This site is dedicated to the open exchange of knowledge, information, and ideas concerning NEPA and other environmental issues. Re: NEPA allows anyone interested in NEPA and related topics to contribute thoughts and ideas in an open forum.

<http://www.fhwa.dot.gov/environment/strmlng/index.htm>.

This website provides information on environmental streamlining — the term for a new cooperative approach to implementing transportation projects that brings together timely delivery and the protection and enhancement of the environment. It was first enacted into legislation for highway and transit projects with TEA-21.

<http://www.fta.dot.gov/office/planning/envr.htm>. This website provides information on environmental streamlining and the environmental process.

PUBLIC PARTICIPATION

What is the role of public participation in the development of transportation policies, programs, and projects?

Public participation is integral to the MPO's transportation mission. Without meaningful public involvement, there is a risk of making less than optimal decisions. With it, it is possible to make a lasting contribution to an area's quality of life. Public involvement is more than an agency requirement and more than a means of fulfilling a statutory obligation. True public participation is central to good decisionmaking.

Paratransit:

A variety of smaller, often flexibly scheduled and routed transportation services using low-capacity vehicles, such as vans, which operate within normal urban transit corridors or rural areas. These services usually serve the needs of people that standard mass transit services would serve with difficulty, or not at all. Often, the patrons include the elderly and people with disabilities.

The fundamental objective of public participation programs is to assure that the concerns and issues of everyone with a stake in transportation decisions are identified and addressed in the development of the policies, programs, and projects being proposed in their communities.

Who is the public?

The public includes anyone who resides, has an interest, or does business in a given area potentially affected by transportation decisions. This includes both individuals and organized groups. It is also important to provide opportunities for the participation of all private and public providers of transportation services, including, but not limited to, the trucking and rail freight industries, rail passenger industry, taxicab operators, and all transit and paratransit service operators. Finally, those persons traditionally underserved by existing transportation systems, such as low-income or minority households (see section on Environmental Justice) and the elderly, should be encouraged to participate in the transportation decisionmaking process.

Federal, state, and local agencies with an interest in transportation issues play a particularly important role in the development of transportation projects. Many of those agencies have a statutory responsibility to review environmental documents or issue permits for transportation projects. FHWA and FTA encourage MPOs and state DOTs to aggressively pursue improved communication and collaboration with these partners, beginning early in the transportation planning process, to identify and address their concerns.

What is the role of the MPO in implementing public participation processes?

As the agency responsible for coordinating the regional transportation planning process, the MPO must actively involve all affected parties in an open, cooperative, and collaborative process that provides meaningful opportunities to influence transportation decisions. Transportation has a profound influence on the lives of people. Decisionmakers must consider fully the social, economic, and environmental consequences of their actions, and assure the public that transportation programs support adopted land use plans and community values.

MPOs must develop, with the public, effective involvement processes custom tailored to local conditions. Rather than establishing a set of uniform rules, the policies of FHWA and FTA establish performance standards that include:

- Early and continuous involvement;
- Reasonable public availability of technical and other information;
- Collaborative input on alternatives, evaluation criteria, and mitigation needs;
- Open public meetings where matters related to transportation policies, programs, and projects are being considered; and
- Open access to the decisionmaking process prior to closure.

What are the indicators of an effective public participation process?

A well-informed public has the best chance to contribute meaningful input into transportation decisions, through a broad array of involvement opportunities at all stages of decisionmaking. Six useful elements in planning for effective public involvement are:

- Clearly defined purpose and objectives for initiating a public dialogue on transportation issues;
- Specific identification of who are the affected public and other stakeholder groups with respect to the plans and programs under development;
- Identification of techniques for engaging the public in the process;
- Notification procedures that effectively target affected groups;
- Education and assistance techniques, which result in an accurate and full public understanding of transportation issues; and
- Followthrough by the MPO demonstrating that decisionmakers seriously considered public input.

Additional sources of information:

<http://www.fhwa.dot.gov/environment/pubinv2.htm>.

Explores many of the transportation issues of greatest concern to the public, and provides more information to MPOs seeking guidance on involving the public.

Public Involvement Techniques for Transportation Decision-making, FHWA and FTA, 1996, Publication No. FHWA-PD-96-031.

<http://www.fta.dot.gov/office/planning/pi.htm>. This website provides access to a number of publications on public involvement.

SAFETY

How important is safety in transportation planning?

Safety is one of the most important goals in the operation of the transportation system. Over the past three decades, transportation fatality rates have declined in relationship to system usage, due in large part to safer cars, tougher police enforcement, and increasing use of seat belts, air bags, and child safety seats. However, in many accident categories, the actual number of accidents has increased because there are more people using the transportation system. Integrating safety into metropolitan transportation planning requires MPO coordination with transit, state highway and motor carrier safety agencies, and their safety processes.

What is the role of the MPO in transportation safety?

Transportation planning takes safety considerations into account by identifying high-accident locations and giving them high priority for improvements. Many MPOs also participate in safety campaigns that educate the public on good safety practices.

Many state DOTs and local transportation agencies have developed safety management systems that monitor accident locations in their jurisdictions over time. The MPO can participate in data collection for these systems or coordinate the development of a regional safety management system.

What are the planning requirements for incorporating safety into transportation planning?

TEA-21 included safety as one of the seven planning factors to be considered in the transportation planning process, stating that the planning process should consider projects and strategies that will “increase the safety and security of the transportation system for motorized and non-motorized users.”

Short- and long-range plans should have a safety element as part of the plan, and when projects and strategies are evaluated for possible inclusion in the TIP, safety should be a factor in their rating.

Additional sources of information:

<http://safety.fhwa.dot.gov> is an FHWA site that provides information on ways to improve safety on roadways.

<http://transit-safety.volpe.dot.gov> is an FTA site that provides information on safety and security of mass transit systems.

Bureau of Transportation Statistics. Annual statistical reports provide national numbers on crash statistics: <http://www.bts.gov/>.

<http://nationalacademies.org/trb/publications/circulars/ec025.pdf> is a TRB circular on safety conscious planning for a multi-stakeholder workshop held in May 2000.

<http://www.ite.org/> contains an Institute of Transportation Engineers' discussion paper, "The Development of the Safer Transportation Network Planning Process."

SYSTEM MANAGEMENT AND OPERATIONS (M&O)

What is system management and operations?

Reliability of trip making:

The level of reliability of the time it takes to make a specific trip; for example, one's daily commute, or the time it takes for goods to move between shipper and receiver.

System management and operations (M&O) analyzes regional transportation as an interconnected set of services and systems, to improve system performance through better management and use of the transportation network.

In identifying possible system M&O improvements, it is important to understand what system users want in terms of performance. Some examples of user-oriented performance measures are average trip travel time, length of delay, and reliability of trip making. These are important indicators of how well the transportation system is operating.

Successfully implementing M&O strategies requires close coordination among the many different agencies and groups with responsibility for transportation system performance.

What are some examples of M&O tools?

Intelligent Transportation Systems (ITS) are technological tools that can help to facilitate better system M&O. For example, roadway video surveillance allows better responses to changes in network conditions, such as clearing an accident faster to keep traffic moving. ITS technologies also can be used to collect real-time data, like travel speeds, which can be used to monitor system performance over time.

Other examples of system M&O tools include:

- Metropolitan traffic management centers
- Traffic signal coordination
- Freeway/arterial corridor management
- Incident management programs
- Preferential treatment for transit/rideshares
- Special event traffic management
- Emergency management strategies
- Pricing of transportation services
- Customer information services
- ITS applications for transit
- Traveler Information
- Commercial vehicle programs

What is the role of the MPO in enhancing system management and operations?

Identifying M&O strategies and benefits: When developing the transportation plan, the MPO should consider using M&O strategies as one method of improving mobility for constituents. Those programs and projects should then be given high priority in the TIP.

Coordinating with all agencies involved: Many different agencies assist in system management and operations in a typical metropolitan area. The MPO can provide regional leadership in establishing a decisionmaking framework by bringing parties together, by helping to determine how M&O decisions will be made in an area, and by asking for input on M&O issues as part of the planning process. This allows agencies to develop M&O strategies in common.

Develop performance measures: The MPO should develop system performance measures that take into account the desires and expectations of transportation users, and can be used to decide how funds should be spent. The MPO can then work to improve the system through future plans and TIPs.

Additional sources of information:

<http://www.ops.fhwa.dot.gov/> is the FHWA's operations site, with information on travel management, transportation operations, freight management, and ITS.

www.its.dot.gov is the Department of Transportation's official ITS site.

A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility. Institute of Transportation Engineers: Washington, D.C., 1997.

Federal Highway Administration, *Managing Our Congested Streets and Highways*, U.S. DOT, 2001.

<http://www.itsa.org/> is the website for ITS America, a nonprofit organization that acts as a clearinghouse for information on ITS.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

What is TDM?

In its broadest sense, TDM is any action or set of actions designed to influence the intensity, timing, and distribution of transportation demand, in order to reduce traffic congestion or enhance mobility.

Such actions can include offering commuters alternative transportation modes and/or services, providing incentives to travel on these modes or at non-congested hours, providing opportunities to link or “chain” trips together, and/or incorporating growth management or traffic impact policies into local development decisions.

What is the role of the MPO in encouraging the use of TDM actions?

Transportation demand management strategies are part of the toolbox of actions available to transportation planners for solving transportation problems. As such, MPOs should make sure that TDM actions are considered in the planning process.

In areas where congestion management systems are required (populations greater than 200,000), TDM actions are among the strategies that can reduce congestion or enhance mobility.

What is the likely impact of TDM actions on transportation system performance?

Available evidence suggests that well-conceived and aggressively promoted demand reduction programs can decrease peak period traffic by as much as 10 to 15 percent. In fact, significantly higher demand reduction levels have been achieved at several employment sites.

Demand reduction efforts, however, unless undertaken on a truly massive scale, can have only a local impact. They can relieve spot congestion - for example, at entrances and exits to large employment centers - but they cannot appreciably reduce traffic on freeways and major arterials.

The only exception to this seems to be areawide road pricing practices, such as tolls and “hot lanes,” that (at least as modeled) appear to have significant influence on travel demand.

Studies have shown that employer support for ride sharing, use of financial incentives to shift travel to alternative modes, restricting the number and use of parking spaces, and charging higher prices for parking are important supporting strategies for changing traveler behavior.

Additional sources of information:

A Toolbox for Alleviating Traffic Congestion and Enhancing Mobility. Institute of Transportation Engineers: Washington, D.C., 1997.

ACRONYMS AND GLOSSARY

3-C	Continuing, Comprehensive and Cooperative Planning Process	ITS	Intelligent Transportation Systems
ADA	Americans with Disabilities Act	LOS	Level of Service (traffic flow rating)
ADT	Average Daily Traffic (or Average Daily Trips)	MIS	Major Investment Study
APTA	American Public Transportation Association	M/O	Management and Operations
ASHTO	American Association of State Highway and Transportation Officials	MPO	Metropolitan Planning Organization
CAA	Clean Air Act	MSA	Metropolitan Statistical Area
CAAA	Clean Air Act Amendments	MTP	Metropolitan Transportation Plan
CIP	Capital Improvement Program	NAAQS	National Ambient Air Quality Standards
CMAQ	Congestion Mitigation and Air Quality Program	NEPA	National Environmental Policy Act of 1969
CMS	Congestion Management System	PE	Preliminary Engineering
DOT	Department of Transportation	PL	Planning Funds
EIS	Environmental Impact Statement	SIP	State Implementation Plan
EPA	Environmental Protection Agency	SP&R	State Planning and Research Funds
FAA	Federal Aviation Administration	STIP	State Transportation Improvement Program
FHWA	Federal Highway Administration	STP	Surface Transportation Program
FTA	Federal Transit Administration	TEA-21	Transportation Equity Act for the 21st Century
GIS	Geographic Information Systems	TCM	Transportation Control Measure
HOV	High-Occupancy Vehicle	TDM	Transportation Demand Measure
IHS	Interstate Highway System	TIP	Transportation Improvement Program
I/M	Inspection and Maintenance	TMA	Transportation Management Area
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991	TSM	Transportation System Management
		UPWP	Unified Planning Work Program

Area Sources	Small stationary and nontransportation pollution sources that are too small and/or numerous to be included as point sources but may collectively contribute significantly to air pollution (e.g., dry cleaners, crop burning).
Arterial Street	A class of street serving major traffic, not designated as a highway.
Attainment Area	An area considered to have air quality that meets or exceeds the U.S. EPA health standards used in the CAA. An area may be an attainment area for one pollutant and a nonattainment area for others. Nonattainment areas are areas considered not to have met these standards for designated pollutants.
Clean Air Act (CAA)	Identifies actions to be taken by states and MPOs to reduce emissions from on-road mobile sources.
Capital Program Funds	Financial assistance from the Capital Program of 49 U.S.C. This program enables the Secretary of Transportation to make discretionary capital grants and loans to finance public transportation projects divided among fixed guideway (rail) modernization; construction of new fixed guideway systems and extensions to fixed guideway systems; and replacement, rehabilitation, and purchase of buses and rented equipment, and construction of bus-related facilities.
Capacity	A transportation facility's ability to accommodate a moving stream of people or vehicles in a given time period.
Carbon Monoxide (CO)	A colorless, odorless, tasteless gas formed in large part by incomplete combustion of fuel. Human activities (i.e., transportation or industrial processes) are largely the source for CO contamination.
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Provides funding for metropolitan area based on the population of each nonattainment and maintenance area.
Congestion Management System (CMS)	Systematic process for managing congestion. Provides information on transportation system performance and finds alternative ways to alleviate congestion and enhance the mobility of people and goods, to levels that meet state and local needs.
Conformity	The compliance of any transportation plan, program, or project with air quality implementation plans. The conformity process is defined by the CAA.
Department of Transportation (DOT)	When used alone, indicates U.S. Department of Transportation. In conjunction with a place name, indicates state, city, or county transportation agency (e.g., Illinois DOT, Los Angeles DOT).

Emissions Budget	The part of the SIP that identifies the allowable emissions levels mandated by the NAAQS for certain pollutants emitted from mobile, stationary, and area sources. The emissions budget is used for meeting emission reduction milestones, attainment, or maintenance demonstrations.
Environmental Justice (EJ)	Environmental justice ensures that services and benefits allow for meaningful participation and are fairly distributed to avoid discrimination.
Environmental Protection Agency (EPA)	The federal regulatory agency responsible for administering and enforcing federal environmental laws, including the Clean Air Act, the Clean Water Act, the Endangered Species Act, and others.
Federal Highway Administration (FHWA)	A branch of the U.S. Department of Transportation that administers the Federal-Aid Highway Program, providing financial assistance to states to construct and improve highways, urban and rural roads, and bridges. The FHWA also administers the Federal Lands Highway Program, including survey, design, and construction of forest highway system roads, parkways and park roads, Indian reservation roads, defense access roads, and other federal lands roads.
Fiscal Constraint	Making sure that a given program or project can reasonably expect to receive funding within the time allotted for its implementation.
Financial Planning	The process of defining and evaluating funding sources, sharing the information, and deciding how to allocate the funds.
Financial Programming	A short-term commitment of funds to specific projects identified in the regional Transportation Improvement Program (see TIP).
Fine Particulates	One of the six EPA “criteria pollutants” for air quality, and one of the pollutants generated by on-road mobile sources. PM-10, or any airborne solid or liquid particles smaller than 10 microns.
Formula Capital Grants	Federal transit funds for transit operators; allocation of funds overseen by FTA.
Federal Transit Administration (FTA)	A branch of the U.S. Department of Transportation that is the principal source of federal financial assistance to America’s communities for planning, development, and improvement of public or mass transportation systems. FTA provides leadership, technical assistance, and financial resources for safe, technologically advanced public transportation to enhance mobility and accessibility, to improve the Nation’s communities and natural environment, and to strengthen the national economy.
Geographic Information System (GIS)	Computerized data management system designed to capture, store, retrieve, analyze, and display geographically referenced information.

High-Occupancy Vehicle (HOV)	Vehicles carrying two or more people. The number that constitutes an HOV for the purposes of HOV highway lanes may be designated differently by different transportation agencies.
Interstate Highway System (IHS)	The system of highways that connects the principal metropolitan areas, cities, and industrial centers of the United States. Also connects the United States to internationally significant routes in Canada and Mexico.
Intermodal	The ability to connect, and the connections between, modes of transportation.
Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)	Legislative initiative by the U.S. Congress that restructured funding for transportation programs; authorized an increased role for regional planning commissions/MPOs in funding decisions; and required comprehensive regional and statewide long-term transportation plans.
Intelligent Transportation Systems (ITS)	The application of advanced technologies to improve the efficiency and safety of transportation systems.
Land Use	Refers to the manner in which portions of land or the structures on them are used; i.e, commercial, residential, retail, industrial, etc.
Long-Range Transportation Plan (LRTP)	A document resulting from regional or statewide collaboration and consensus on a region's or state's transportation system, and serving as the defining vision for the region's or state's transportation systems and services. In metropolitan areas, the plan indicates all the transportation improvements scheduled for funding over the next 20 years.
Maintenance Area	A probationary status for a region that is nonattainment for air quality but is taking the required steps to comply with the Clean Air Act.
Metropolitan Planning Organization (MPO)	Regional policy body, required in urbanized areas with populations over 50,000, and designated by local officials and the governor of the state. Responsible, in cooperation with the state and other transportation providers, for carrying out the metropolitan transportation planning requirements of federal highway and transit legislation.
Metropolitan Transportation Plan (MTP)	The official intermodal transportation plan that is developed and adopted through the metropolitan transportation planning process for the metropolitan planning area, in accordance with 23 U.S.C. 134, 23 U.S.C. 135, and 49 U.S.C. 5303.
Mobile Source	Mobile sources are referred to as contributors to pollution. Some examples include motor vehicles, aircraft, seagoing vessels, and other transportation modes. The mobile source-related pollutants are carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), and small particulate matter (PM-10).
Mode	A specific form of transportation, such as automobile, subway, bus, rail, or air.

National Ambient Air Quality Standards (NAAQS)	Federal standards that set allowable concentrations and exposure limits for various pollutants. The EPA developed the standards in response to a requirement of the CAA.
National ITS Architecture	A systems framework to guide the planning and deployment of ITS infrastructure. The national ITS architecture is a blueprint for the coordinated development of ITS technologies in the United States. It is unlikely that any single metropolitan area or state would plan to implement the entire national ITS architecture.
National Environmental Policy Act of 1969 (NEPA)	Established a national environmental policy requiring that any project using federal funding or requiring federal approval, including transportation projects, examine the effects of proposed and alternative choices on the environment before a federal decision is made.
Nonattainment	Any geographic area that has not met the requirements for clean air as set out in the Clean Air Act of 1990.
Ozone (O₃)	Ozone is a colorless gas with a sweet odor. Ground-level ozone is not a direct emission from transportation sources. It is a secondary pollutant formed when volatile organic compounds, such as pesticides and solvents, and NO _x combine in the presence of sunlight. Although the ozone in the upper atmosphere protects us from harmful ultraviolet rays, ground-level ozone is the main component of smog.
Performance Measures	Indicators of how well the transportation system is performing with regard to such things as average speed, reliability of travel, and accident rates. Used as feedback in the decisionmaking process.
Planning Funds (PL)	Primary source of funding for metropolitan planning designated by the FHWA.
Public Participation	The active and meaningful involvement of the public in the development of transportation plans and programs.
State Implementation Plan (SIP)	Produced by the state environmental agency, not the MPO. Contains specific strategies for controlling emissions and reducing ambient levels of pollutants, in order to satisfy the CAA requirements for demonstrations of reasonable further progress toward attainment. Must be taken into account in the transportation planning process.
Smart Growth	A set of policies and programs design to protect, preserve, and economically develop established communities and valuable natural and cultural resources.

Sources	Refers to the origin of air contaminants. Can be point (coming from a defined site) or non-point (coming from many diffuse sources). Stationary sources include relatively large, fixed facilities such as power plants, chemical process industries, and petroleum refineries. Area sources are small, stationary, non-transportation sources that collectively contribute to air pollution, and include such sources as dry cleaners and bakeries, surface coating operations, home furnaces, and crop burning. Mobile sources include on-road vehicles such as cars, trucks, and buses; and off-road sources such as trains, ships, airplanes, boats, lawnmowers, and construction equipment.
Sprawl	Urban form that connotatively depicts the movement of people from the central city to the suburbs. Concerns associated with sprawl include loss of farmland and open space due to low-density land development, increased public service costs, and environmental degradation as well as other concerns associated with transportation.
State Planning and Research Funds (SP&R)	Primary source of funding for statewide long-range planning.
Stakeholders	Individuals and organizations involved in or affected by the transportation planning process. Include federal/state/local officials, MPOs, transit operators, freight companies, shippers, and the general public.
Statewide Transportation Plan	The official statewide intermodal transportation plan that is developed through the statewide transportation planning process.
State Transportation Improvement Program (STIP)	A staged, multi-year, statewide, intermodal program of transportation projects, consistent with the statewide transportation plan and planning processes as well as metropolitan plans, TIPs, and processes.
Surface Transportation Program (STP)	Federal-aid highway funding program that funds a broad range of surface transportation capital needs, including many roads; transit, sea and airport access; vanpool; bike; and pedestrian facilities.
Transportation Equity Act for the 21st Century (TEA-21)	Authorized in 1998, TEA-21 authorized federal funding for transportation investments for fiscal years 1998-2003. Approximately \$217 billion in funding was authorized, the largest amount in history, which is used for highway, transit, and other surface transportation programs.
Transportation Control Measures (TCM)	Specific measures that reduce emissions by either reducing vehicle use or reducing traffic flow. Examples: improved public transit, high-occupancy vehicle lanes, shared-ride services, bicycle/pedestrian facilities, and flexible work schedules.
Transportation Demand Management (TDM)	Programs designed to reduce demand for transportation through various means, such as the use of transit and of alternative work hours.

Telecommuting	Communicating electronically (by telephone, computer, fax, etc.) with an office, either from home or from another site, instead of traveling to it physically.
Title VI	Title VI of the Civil Rights Act of 1964. Prohibits discrimination in any program receiving federal assistance.
Transportation Improvement Program (TIP)	A document prepared by a metropolitan planning organization that lists projects to be funded with FHWA/FTA funds for the next one- to three-year period.
Transportation Management Area (TMA)	All urbanized areas over 200,000 in population, and any other area that requests such designation.
Trust Fund	A fund credited with receipts that are held in trust by the government and earmarked by law for use in carrying out specific purposes and programs in accordance with an agreement or a statute.
Unified Planning Work Program (UPWP)	The management plan for the (metropolitan) planning program. Its purpose is to coordinate the planning activities of all participants in the planning process.
Urbanized Area	Area that contains a city of 50,000 or more population plus incorporated surrounding areas meeting size or density criteria as defined by the U.S. Census.

APPENDIX: FEDERALLY AIDED TRANSPORTATION PROGRAMS

A modified version of the following tables is found in *Financing the Statewide Plan: A Guidebook*, Federal Highway Administration, November 1999: www.fhwa.dot.gov/hep10/state/04703r04.pdf

Federal Transportation Programs and Revenue Sources

Mode	Major Transportation Programs	Federal Revenue Sources
Administered by FHWA	<ul style="list-style-type: none"> • Interstate Maintenance • National Highway System • Bridge Replacement and Rehabilitation • Congestion Mitigation and Air Quality Improvement • Surface Transportation Program • National Corridor Planning and Development and Coordinated Border Infrastructure • High Priority (Demonstration) Projects • Intelligent Transportation Systems • Minimum Guarantee 	<ul style="list-style-type: none"> • Highway Trust Fund with funds from federal: <ul style="list-style-type: none"> - Motor Fuel Tax (15.44 cents/gallon of gasoline; varies for other fuel types) - Truck and Trailer Tax - Tire Tax - Heavy Vehicle Use Tax - Tire Tax Quality Improvement
Administered by FTA	<ul style="list-style-type: none"> • Capital (Section 3009) • Urbanized Area Formula (Section 3007) • Other than Urbanized Area Formula (Section 3014) • Congestion Mitigation and Air Quality Improvement (in air quality nonattainment and maintenance areas) • Formula Grants for Special Needs of Elderly Individuals and Persons With Disabilities (Section 3037) • Clean Fuels Formula Grants (Section 3008) 	<ul style="list-style-type: none"> • Mass Transit Account of the Highway Trust Fund with funds from motor fuel tax (2 cents/gallon) • General Fund • Interest
Administered by FAA	<ul style="list-style-type: none"> • Federal Airport and Airway Trust Fund, which is the source for: <ul style="list-style-type: none"> - Airport development grants - Airport planning grants 	<ul style="list-style-type: none"> • Aviation Fuel Tax • Air Freight Tax • Passenger Ticket Tax • International Departure Tax
Administered by FTA, FHWA, FRA	<ul style="list-style-type: none"> • Light Density Rail Line Pilot Projects • Federal Railroad Administration Grants (planning, rail service continuation, rehabilitation, provision of substitute service) • CMAQ 	<ul style="list-style-type: none"> • General Fund

Federal Transportation Programs and Revenue Sources (continued)

Mode	Major Transportation Programs	Federal Revenue Sources
Administered by FRA & FTA	<ul style="list-style-type: none"> • Magnetic Levitation Transportation Technology Deployment • High-Speed Rail • Amtrak • CMAQ 	<ul style="list-style-type: none"> • Highway Trust Fund • General Fund • General Fund (relies on specific capital appropriations) • Passenger Fares • Food/Beverage Revenue
Administered by MARAD & FHWA	<ul style="list-style-type: none"> • Army Corps of Engineers - Construction, operation, and maintenance of waterways, locks and harbors • Construction of Ferry Boats and Terminal Facilities 	<ul style="list-style-type: none"> • Fuel taxes paid by inland water carriers • Ad valorem taxes paid by users of ports • Highway Trust Fund
Administered by FHWA	<ul style="list-style-type: none"> • Surface Transportation Program, including Enhancements • National Highway System • Congestion Mitigation and Air Quality Improvement • Federal Lands • Scenic Byways • Recreational Trails 	<ul style="list-style-type: none"> • Highway Trust Fund

Major Federal-Aid Highway Programs Under TEA-21

Program	Eligible Uses	Federal Share of Funded Projects
Surface Transportation (STP)	Broad range of surface transportation capital needs, including many roads, transit, sea, and airport access, vanpool, bike, and pedestrian facilities.	80%
National Highway System (NHS)	Interstate routes, major urban and rural arterials, connectors to major intermodal facilities, national defense network. Fifty percent of NHS funds can be freely flexed to STP; 100% with USDOT approval.	80%
Interstate Maintenance	Resurfacing, restoring, and rehabilitating routes on the interstate highway system, but no new capacity except HOV or auxiliary lanes in nonattainment areas.	90% (80% for added capacity in attainment areas).
Bridge Replacement and Rehabilitation	Replacement and rehabilitation of any public bridge.	80%
Congestion Mitigation and Air Quality	A wide range of projects in air quality nonattainment and maintenance areas for ozone, carbon monoxide, and small particulate matter, which reduce transportation-related emissions.	80%
Metropolitan Planning (PL) Funds	All planning activities are eligible (e.g., modeling, air quality analysis, public determines outreach, environmental analysis).	Federal participation is 80% unless the Secretary determines that changing this contribution level is warranted.

Federal Transit Administration Urban-Related Programs

Program	Eligible Uses	Federal Share of Funded Projects/ Services
Urbanized Areas (91.23%) Section 3007 50,000-200,000 Over 200,000	Capital and operating expenditures. Capital and preventive maintenance; 1% must go to transit enhancements.	80%; 90% for incremental costs of vehicle-related equipment to comply with CAAA and ADA.
Other than Urbanized Areas (6.37%) Section 3014	Capital and operating expenditures in non-urbanized areas (under 50,000).	80%; 90% for incremental costs of vehicle-related equipment to comply with CAAA and ADA.
Special Needs of the Elderly and Individuals with Disabilities (2.4%) Section 3013	Capital assistance to organizations providing specialized services for the elderly and disabled.	80%; 90% for incremental costs of vehicle-related equipment to comply with CAAA and ADA.
Clean Fuels (Set-aside before allocation to areas) Section 3008	Purchase, lease of clean fuel buses and facilities; improvements to existing facilities to accommodate clean fuel vehicles.	80%
Capital Investment Grants and Loans Section 3009	New starts or extensions to existing fixed guideway systems (40%); comply with CAAA and ADA. Fixed guideway modernization (40%). Bus and related facilities (20%).	80%; 90% for incremental costs; of vehicle-related equipment.
Job Access and Reverse Commute Grants Section 3037	Capital and operating costs of job; access transportation services. Promotion of special services, programs.	50%

Funding Transferability Under TEA-21

Program	Transferability
National Highway System (NHS)	<ul style="list-style-type: none"> • States may freely transfer up to 50 percent of NHS apportionments to I/M, STP, CMAQ, and/or Bridge Replacement/Rehabilitation. • States may transfer up to 100 percent of NHS apportionments to STP, if approved by Secretary of Transportation and if sufficient notice and opportunity for public comment is given.
Interstate Maintenance (IM)	<ul style="list-style-type: none"> • States may transfer up to 50 percent of I/M apportionments to NHS, STP, CMAQ, and/or Bridge Replacement/Rehabilitation.
Bridge Replacement and Rehabilitation	<ul style="list-style-type: none"> • Up to 50 percent of Bridge Program apportionments may be transferred to NHS, I/M, STP, and/or CMAQ. • Funds set aside for bridges not on federal-aid highways (off-system bridges) may not be transferred unless a determination is made that the state has inadequate needs to justify expenditure of the full amount of the set aside funds.
Congestion Mitigation and Air Quality (CMAQ)	<ul style="list-style-type: none"> • States may transfer up to 50 percent of the amount by which the CMAQ apportionment for the fiscal year exceeds the amount that would have been apportioned for that fiscal year if the CMAQ program had been funded at \$1.35 billion annually to STP, NHS, I/M and/or Bridge Replacement/Rehabilitation. Transferred funds may only be used in nonattainment and maintenance areas.
Surface Transportation Program (STP)	<ul style="list-style-type: none"> • Transportation Enhancement (TE) set aside states may transfer up to 25 percent of the difference between the amount set aside for TE for the fiscal year and the amount set aside for TE for FY 1997 to I/M, CMAQ, NHS, and/or Bridge Replacement/Rehabilitation. • Safety set aside funds equivalent to the funds made available for FY 1991 for the Hazard Elimination and Railway-Highway Crossing Programs may not be transferred. Up to 25 percent of the difference between the remainder of the safety set aside for the fiscal year. The “optional safety” funds—and the comparable amount for FY 2007 may be transferred to I/M, CMAQ, NHS, and/or Bridge Replacement/Rehabilitation. • Suballocation to areas-STP funds allocated to sub-state areas (rural, urbanized areas over 200,000 population) may not be transferred. • Transfers to STP from I/M, NHS, CMAQ, and Bridge Programs will not be subject to further STP set asides or suballocations.
Interstate Construction (IC)	<ul style="list-style-type: none"> • A state other than Massachusetts may transfer an amount equivalent to the federal share of the cost to complete its open-to-traffic Interstate segments included in the latest Interstate Cost Estimate (ICE) from its IC funds to NHS and/or I/M. The work on which the transfer is based will be removed from the ICE and will lose its IC fund eligibility. • States may transfer IC funds remaining after all work included in the ICE has been fully financed to the NHS. • States with remaining completion work on Interstate gaps or open-to-traffic segments may relinquish IC fund eligibility and transfer to the NHS amounts equivalent to the federal share of the cost of such work in the most recent ICE.

Innovative Highway Financing Strategies/Tools

Cash Flow Approaches

Tool	Approach
Advance Construction	Allows states to independently raise upfront capital required for a project and preserve eligibility for future federal funding for the project. Projects must be designated as advance construction projects to be eligible.
Partial Conversion of Advance Construction	Form of advance construction; state only converts, obligates, or receives reimbursement for part of its funding for an eligible project in a given year. States no longer have to wait until the full amount of obligation authority is available.
Bond Cost Reimbursement: Grant Anticipation Revenue Vehicle (GARVEE)	State-issued short-term note or long-term bond that uses future federal funds to support payment of principal and interest. Issuance and insurance costs are also eligible. This is generally used in combination with advance construction.
Tailored (Variable) Match	Allows non-federal share to vary over project life, so long as the ultimate matching share is preserved over time.
Program Level	For STP projects, allows federal share for funds to be matched across the full program, not on a project-by-project basis.
Flexible: Federal Land Agency Funds	Funds from other federal agencies may count toward the Management non-federal matching share for recreational trails and transportation enhancement projects.
Flexible: Federal Lands	Funds from a DOT's Federal Lands Highway Program may count toward non-federal match for projects within or providing access to federal or Indian lands.
Flexible: Publicly-Owned Land	Permits donations of publicly owned property to count toward non-federal match on all federal-aid highway projects.

Leveraging Tools

Tool	Approach
Flexible Match	Allows states to apply private donations of materials, labor, or assets and private funds toward the state or local match for federal-aid projects.
Federal Share on Toll Projects	Expanded use of federal funds for toll projects to include construction of new facilities, resurfacing, restoration, and rehabilitation of existing facilities and conversion of free facilities. Private facilities are now also eligible.
Bonds and Debt Instrument Financing	Allows states to use federal funds for bond principal, interest costs, issuance costs, and insurance on eligible projects.
ISTEA Section 1012 Loans	Removes the limitation that federal funds can be used only once. Allows states to loan federal funds to leverage any eligible investment; the state can use the funds again once they have been paid back.
ISTEA Section 1044 Toll Investment Credits	Allows states to receive investment credit for certain toll revenue expenditures, which can be applied toward the non-federal matching share of all ISTEA programs.

Credit Tools

Tool	Approach
State Infrastructure Bank	<p>States could allocate up to 10 percent of their ISTEA apportionment to capitalize the state bank. Funds can be used to provide loans for projects. This can be structured as a revolving loan fund, where loans are recycled for new projects.</p> <p>State infrastructure banks can provide third-party guarantees to projects to ensure that there is sufficient revenue to pay project costs or debt service.</p>
Surface Transportation Credit Program	This provides direct federal loans, loan guarantees, and lines of credit for large surface transportation programs of national significance.
Rail Credit Pilot	This provides direct federal loans and loan guarantees for rail and intermodal projects.

Tolls and Other Income-Generating Tools

Tool	Approach
Right-of-Way Income	This allows income from right-of-way sales and leases to be used for Title 23 (highway) purposes, as currently allowed for airspace income.



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Federal Highway Administration

Federal Transit Administration

The American Association of State and Highway Transportation Officials

The American Public Transportation Association

The Association of Metropolitan Planning Organizations

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